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The Changing Role of Education in the Marriage Market: Assortative Marriage in Canada and the United States Since the 1970s

By Feng Hou and John Myles

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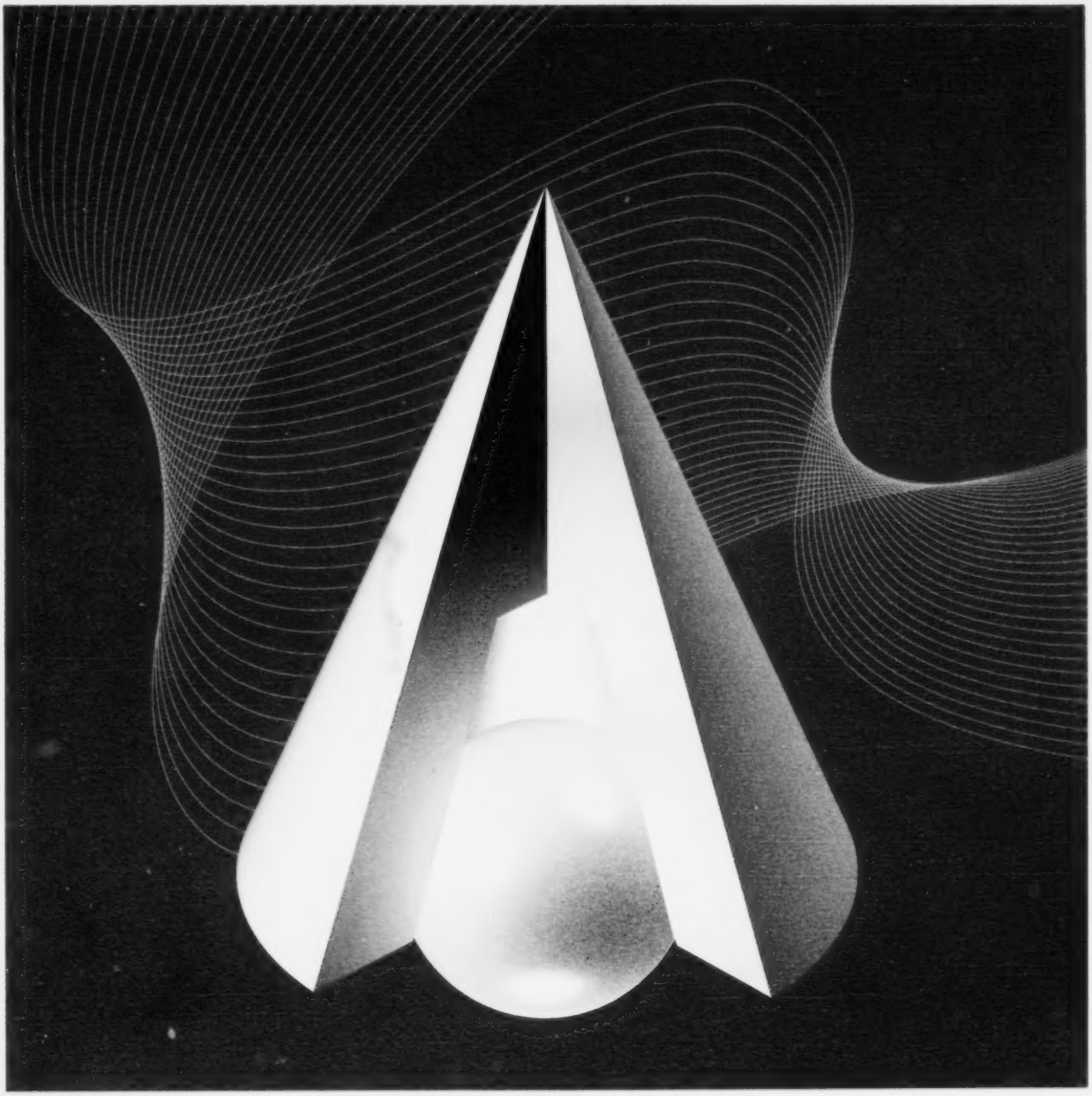

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Abstract

Whether or not relative rates of assortative marriage have been rising in the affluent democracies has been subject to considerable dispute. First, we show how the conflicting empirical findings that have fueled the debate are frequently an artifact of alternative methodological strategies for answering the question. Then, drawing on comparable census data for Canada and the United States, we examine trends in educational homogamy and intermarriage with log-linear models for all marriages among young adults under 35 over three decades. Our results show that educational homogamy, the tendency of like to marry like, has unambiguously risen in both countries since the 1970s, with no sign of the U-turn in levels of intermarriage reported in some earlier comparative studies. Rising levels of marital homogamy were the result of declining intermarriage at both ends of the educational distribution. However, while trends for men and women were quite similar in Canada, they differed significantly in the United States. The overall rise in marital homogamy in the United States was partially offset by an increased tendency of women with some college education to marry 'down' the educational hierarchy. In Canada, the only sign of abatement in the trend toward greater educational homogamy was a slight increase in intermarriage among university-educated men and women during the 1990s.

Keywords: educational homogamy, intermarriage, log-linear models.

Executive summary

Educational homogamy—the tendency of men and women with the same level of education to be married to one another—has important implications for social stratification, family income inequality, and intergenerational mobility. While *absolute* levels of educational homogamy have unambiguously been rising, whether or not *relative* rates of educational homogamy, net of changes in the educational composition of husbands and wives, have also been rising has been a contested issue in the literature. Changes in relative rates are indicative of whether the function of education in mate selection is strengthening or weakening.

In this paper our aim is to answer three questions. First, what is the overall trend in the relative rate of educational marital homogamy in Canada and the United States over the three decades from the beginning of the 1970s to the turn of the century? Second, are the highly educated more likely now than in the past to marry within their own education level or to marry down, and are the less educated more likely than in the past to marry within their own educational class or to marry up? Third, do women and men experience different trends in educational homogamy given that the rapid increase in women's educational attainment relative to men's implies *declining* opportunities for women to marry better-educated men but *rising* opportunities for men to marry more-educated women?

Our analysis of marriages among young adults shows that the overall level of both absolute and relative rates of educational homogamy have unambiguously increased in both countries over the three decades. In Canada, 54% of couples had the same level of education in 2001, up from 42% in 1971. In the United States, some 55% of marriages consisted of couples with the same level of education in 2000, up from 49% in 1970. These overall trends have been driven mainly by changes in the association of husbands' and wives' education rather than by changes in the relative supply of more- and less-educated partners. In Canada, the change in association, net of changes in the distributions of wives' and husbands' education levels, accounts for almost 10 percentage points of the 12-percentage-point increase in educational homogamy from 1971 to 2001. In the United States, the change in association accounts for 4 percentage points of the 6-percentage-point increase.

In both countries, intermarriage across education levels occurs primarily between adjacent education levels, and intermarriage across more than one education level is relatively rare. Therefore, changes in intermarriage between adjacent education levels dominate the overall trends in educational homogamy.

Rising educational homogamy has been driven mainly by changes at the top and at the bottom of the educational hierarchy.

Declining intermarriage between those with university degrees and those with less education was a major factor in both countries. In Canada, the relative rate of intermarriage between the university educated and those with only some post-secondary education fell by 38% and in the United States, by 45%. Whereas Canadian trends were quite similar for men and women, the U.S. decline was almost entirely driven by declining intermarriage among university-educated men.

Similarly, the odds of intermarriage between high-school graduates and those with less than high-school completion fell by 30% in the United States and by 58% in Canada. In Canada, this was a common pattern among both men and women while in the United States the trend was mainly confined to men.

There were two important exceptions to the general trend towards rising homogamy. The first was an increase in intermarriage between women with some post-secondary education and men with high-school graduation in the United States. The second was a small increase in intermarriage in the 1990s among male and female university graduates in Canada and among female university graduates in the United States, suggesting that levels of educational homogamy among the better educated may be stabilizing.

1. *Introduction*

The inequalities in the distribution of market incomes among families has become markedly more important in most affluent nations over the past quarter century (Kenworthy, 2004), and rising rates of marital homogamy—the tendency of men and women with high earnings to be married to one another—is increasingly cited as one of the major factors underlying this trend (Esping-Andersen, 2007; Kenworthy, 2004). As women's labour force participation and education levels have risen, the correlation between husbands' and wives' earnings has also risen (Hyslop, 2001; Fortin and Schirle, 2006), reflecting the fact that well-educated men and women tend to marry one another and form families with high earnings and few risks of unemployment. Less well-educated couples have lower wages, and both partners are far more likely to experience periods without work.

While *absolute* levels of educational homogamy have unambiguously been rising, whether or not *relative* rates of educational homogamy, net of changes in the educational composition of husbands and wives, have also been rising has been a contested issue (see Table 1).[1] Changes in *absolute* rates of educational endogamy/exogamy are of interest, when the question concerns the *effects* of educational homogamy on outcomes such as family earnings inequality (Goldthorpe, 1987). However, if changes in marital patterns are entirely exogenous to the mate selection process (i.e., entirely a result of changes in the marginal education distributions of men and women), the nature of the question changes entirely. If the rising share of university-educated men married to university-educated women is mainly due to the rising share of women with university degrees, for example, the only task that remains is to explain the rise in women's educational attainment. Changes in relative rates, in contrast, are indicative of whether the function of education in mate selection is strengthening or weakening.

In this paper, our aim is to answer three questions. First, what is the overall trend in the relative rate of educational marital homogamy in Canada and the United States over the three decades from the beginning of the 1970s to the turn of the century? Since the average trend may conceal offsetting changes at different levels in the educational hierarchy, however, we also examine trends among the main subcomponents of the educational hierarchy.[2] Are the highly educated

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1. The analysis of educational homogamy has been modelled more or less self-consciously along the lines of traditional studies of intergenerational occupational inheritance captured by the cross-classification of a hierarchically ordered distribution of occupations held by a generation of adults with that of the parental generation (usually fathers). The questions of interest in social mobility studies concern whether or not societies are more 'fluid' or 'open' than in the past, whether some class boundaries are more permeable than others, or whether some societies are more open than others. From the outset, researchers recognized that, where the marginal distributions of such tables were not identical, some degree of mobility would be displayed of necessity; it is simply not arithmetically possible for all cases in the table to fall in the diagonal (Goldthorpe, 2000). Similarly, as some occupations decline and others expand, the absolute amount of mobility will also change. To address this issue, mobility researchers turned to odds ratios and log-linear analysis to distinguish between *absolute* mobility rates (the total rates shown in a percentage table) and *relative* mobility rates, the odds ratios that define the association between occupational origins and destinations, net of changes or differences in the marginal distribution of occupations. Both the methods (odds ratios, log-linear analysis) and metaphors (absolute versus relative rates, 'openness,' 'permeability') of social mobility studies have become standard fare in analyses of marital homogamy.
2. Since intermarriage occurs primarily between adjacent education levels, a decline in intermarriage at the top of the educational hierarchy does not necessarily correspond to a decline in intermarriage at the bottom of the educational distribution.

more likely now than in the past to marry within their own educational class or to marry down? Are the less educated more likely than in the past to marry within their own educational class or to marry up? Finally, we consider the gender-specific features of these trends. Since the rapid increase in women's educational attainment relative to men' implies *declining* opportunities for women to marry better-educated men but *rising* opportunities for men to marry more-educated women, we consider how these trends differ for men and women.

Compared to previous studies, our approach is most similar in spirit to that of Schwartz and Mare (2005) who address the first two of our questions in the context of the United States but do not test for gender asymmetries in homogamy/intermarriage trends. Paradoxically, we find that the assumption of gender symmetry provides a reasonable fit for the Canadian but not the U.S. data, a finding that changes our understanding of the overall trends. Though not a major focus of our analysis, we also cast some doubt on their claim that U.S. homogamy rates fell over the period from the 1940s to the 1960s.

The paper is organized as follows. Section 2 provides an overview of recent debates on relative rates of educational homogamy and the empirical results that have stimulated these discussions. In Section 3, we sort out a series of methodological issues related to the measurement of educational homogamy and present the rationale for the methodological strategies adopted here. Section 4 describes our data and Section 5 presents our results. Section 6 concludes.

2. *Literature review: Has educational homogamy changed?*

As Halpin and Chan (2003: 473) observe, "education has always been a factor in the choice of mate selection in modern societies." Schools and universities provide contexts in which young people meet one another and produce common understandings of desirable lifestyles and cultural tastes. There are many reasons why post-industrial societies are likely to reinforce such patterns. Rising levels of post-secondary education among women in recent decades have augmented the opportunities for well-educated men to meet well-educated women. Since workplaces are typically characterized by employees with similar levels of education but growing gender diversity, they too provide new sites for meeting potential spouses with similar educational qualifications (Oppenheimer, 1994). Moreover, the rise in women's labour force participation, combined with a growing earnings gap between more- and less-educated workers, has arguably increased the economic incentives for men (and women) to choose a highly educated partner (Kalmijn, 1998).

Studies specifically related to the United States and Canada more or less agree on a rising level of educational homogamy from the early in the 20th century through the 1960s (but see Schwartz and Mare, 2005). Studies of trends since then, however, are far from consistent (see Table 1). Kalmijn (1991a, 1991b) finds that educational homogamy increased steadily over the period from the 1930s to the 1980s in the United States. Ultee and Luijkx (1990) find a slight increase in educational homogamy in the United States, and a slight decrease in Canada up to the end of the 1970s, though in both cases the changes are not statistically significant. Qian and Preston (1993) and Qian (1998) suggest that educational homogamy increased in the 1980s in the United States. Schoen and Cheng (2006) find a rise in educational homogamy in North Carolina and Wisconsin in the 1970s and 1980s. Raymo and Xie (2000) find that educational homogamy was stable in the United States from the early 1970s to the late 1980s. Mare (1991) concluded that

educational homogamy increased from the 1930s to the 1970s but then stabilized or even declined in the 1980s. Schwartz and Mare (2005), in contrast, conclude that homogamy in the United States declined from 1940 to 1960 but then rose from the turn of the century.

Table 1 Overview of major studies on changes in educational homogamy related to United States and Canada, 1990 to 2006

Studies	Educational groupings	Target population	Cohorts of change	Modelling strategies	Data sources	Sample size	Conclusion
Ultee and Luijkx, 1990	4 levels. United States: < Grade 9, 9 to 11, 12, college. Canada: < Grade 9, 9 to 13, some university, university degree	United States: all marriages involved males aged 20 to 64. Canada: all marriages	Overlapping marriage cohorts	Log-linear models: step (distance) parameters	1971 and 1981 Canadian Census; 1962 and 1973 U.S. CPS[1], 1982 to 1985 U.S. GSS[2]	Re-scaled to 1,000 marriages per period/country	Slight fall in homogamy in Canada, rise in the United States
Kalmijn, 1991	5 levels: < Grade 9, 9 to 11, 12, college 1 to 3, college 4+	Couples married within 10 years	Real marriage cohorts	Log-linear models: distance and diagonal parameters	1962 and 1973 OCG[3]	2,400 to 5,000 couples per period	Rise in homogamy
Kalmijn, 1991	4 levels: < Grade 12, 12, college 1 to 3, college 4+	Married couples in their first marriage	Overlapping marriage cohorts	Log-linear models: quasi-symmetry parameters	1955 GAF[4], 1965 NFS[5], 1972 to 1989 GSS	450 to 4,100 per decade	Rise in homogamy
Mare, 1991	5 levels: < Grade 10, 10 to 11, 12, college 1 to 3, college 4+	Couples aged 16 to 34, first marriage within a year	Real marriage cohorts	Log-linear models: crossings parameters	1940, 1960 to 1980 U.S. Census, 1985 to 1987 CPS	4,000 to 13,100 couples per period	Rise in homogamy until the 1970s
Qian and Preston, 1993	3 levels: < Grade 12, 12, college	Newly married couples with women aged 18 to 44	Real marriage cohorts	Harmonic mean function	1973, 1980 and 1988 CPS	< 1,000 couples per year	Rise in homogamy
Qian, 1998	4 levels: < Grade 12, 12, college 1 to 3, college 4+	First married within 5 years, aged 15 to 39	Real marriage cohorts	Log-rate models: asymmetry and crossing models	1970, 1980 Census, 1988, 1990 and 1992 CPS	9,600 to 146,200 couples per period	Rise in homogamy
Raymo and Xie, 2000	4 levels: < Grade 12, 12, college 1 to 3, college 4+	Newly married couples aged 18 to 34	Real marriage cohorts	Log-linear models: diagonal and distance parameters	1970 U.S. Census, 1985 to 1987 CPS	1,300 to 2,000 couples per period	Slight fall in homogamy
Smits, Ultee and Lammers, 2000	4 levels: < Grade 12, 12, college 1 to 4, college 4+	Married couples aged 20 to 52	Cross-sectional age groups	Log-linear models: step (distance) parameters	1976 Canadian Census, 1980 U.S. Census	About 3,500 per age cohort/country	Significant rise in both Canada and the United States
Smits, 2003	2 levels: < Grade 12, 12+	Married couples aged 18 to 52	Cross-sectional age groups	Log-linear models: odds ratio for 2-by-2 table	1976 Canadian Census, 1980 U.S. Census	About 15,000 each age cohort/country	Slight fall in homogamy in both countries
Schwartz and Mare, 2005	5 levels: < Grade 10, 10 to 11, 12, 13 to 15, > = 16	Newly married and prevailing marriages aged 18 to 40	Real and overlapping marriage cohorts	Log-linear models: homogamy and crossings parameters	1940 to 2000 U.S. Census and 1962 to 2003 CPS	Large total sample	Fall from 1940 to 1960, rise afterwards
Schoen and Cheng, 2006	4 levels: < Grade 12, 12, 13 to 15, 16+	Recent marriages	Real marriage cohorts	Harmonic mean function	1970-to-1990 marriage records in two U.S. states	Over 50,000 in each state	Rise in homogamy

1. Current Population Survey.
2. General Social Survey.
3. Occupational Change in Generation.
4. Growth of American Families.
5. National Fertility Survey.

Like Mare (1991), Smits and his associates (Smits, Ultee and Lammers, 1998; Smits, Ultee and Lammers, 2000; and Smits, 2003) report an inverted, yet asymmetric U-curve trend in educational homogamy across a number of nations. They attribute the inverted U-shape pattern to changing preferences associated with modernization. They argue that educational homogamy first rises with industrialization as education becomes increasingly important in deciding individuals' socioeconomic status. People with higher levels of education have greater potential to maximize family socioeconomic status through marriage and thus are more attractive in the marriage market (the status attainment thesis). However, in the later stages of industrialization, continued modernization favours greater societal 'openness' and individualization as people become increasingly able to afford the luxury of mate selection on the basis of other desirable criteria. As highly educated women become increasingly able to support themselves, for example, the incentives to seek out a 'good provider' as a mate may well decline. A growing literature suggests that women's marital preferences have changed as their position in the labour market continues to improve while the opposite is occurring among young men (Duncan, 2003; Oppenheimer, 1997; Sweeney, 2002; and Sweeney and Cancian, 2004). Equipped with potential or realized economic resources, a highly educated woman may be willing and able "to marry a man who is unlikely to be a great provider but who is highly desirable in other respects." (Oppenheimer, 1994: 315).

Mare's (1991) 'life course' thesis attributes the trend reversal to changes in the marital opportunity structure. He suggests that people who are married while they are at school or shortly after leaving school are more likely to have similar levels of education. But as the time gap between leaving school and age of marriage rises, the pool of potential spouses becomes increasingly heterogeneous and is likely to lead to a decline in homogamy. From the early part of the 20th century until the 1970s, the age gap between leaving school and marriage narrowed but has been rising since then. According to the life-course argument, the U-shape trend in the time-gap would lead to a rise in educational homogamy until the 1970s but a decline or stabilization thereafter (Mare 1991; Halpin and Chan 2003).

The inconsistent findings among existing studies are in part attributable to large differences in study populations and methodologies taken up in the following section. However, they also reflect differences in analytical focus. Some studies (e.g., Kalmijn, 1991b; Raymo and Xie, 2000; Smits, Ultee and Lammers, 2000; and Smits, 2003) examine the overall trends without attending to trends among men and women at different education levels. The issue here is that the overall trend may obscure large changes, even in opposite directions, among the underlying components (Wong, 2003). Still other studies draw their conclusions from changes in one or other of the underlying components. Mare (1991), for example, focused mainly on changes in the difficulty of intermarriage between adjacent education levels. When it becomes more difficult for marriage to cross one educational boundary but easier to cross another barrier, it is not clear what the overall trend is. Similarly, a rise in homogamy between highly educated, more affluent, individuals would support the status attainment hypothesis over the 'modernization' thesis but the preferences of the highly educated do not necessarily dominate the overall trend (Smits, 2003). In this respect, the recent U.S. study by Schwartz and Mare (2005) provides an important corrective to earlier research by considering both overall change and trends by education level.

Disentangling the various components of educational homogamy requires a careful reconsideration of the measurement and modelling strategies used in the literature. We turn to these methodological issues in the next section.

3. *Now you see it, now you don't: Measuring changes in educational homogamy* [3]

In this section, we organize our discussion around three issues: (1) the choice of educational grouping; (2) first marriage versus marriage stock, and real marriage cohorts versus synthetic cohorts; and (3) measuring overall and heterogeneous changes in homogamy with log-linear models. From the discussion of the potential impact of these differences on detecting changes in educational homogamy, we can either choose the most appropriate approach or compare results from different approaches in our subsequent analyses.

3.1 Education groupings

Wong (2003) shows that arbitrary and inconsistent classification of education levels is a vital weakness in studies on temporal trends and cross-country differences in educational homogamy. He demonstrates that combining Mare's (1991) five categories of education into four categories results in differential loss of association between wife's and husband's education at various time periods. Aggregation to four categories exaggerates the degree of homogamy at earlier periods and deflates the upward trend. Similarly, the conclusions drawn by Smits, Ultee and Lammers (2000) and by Smits (2003) are quite different, although the only difference between the two studies is that the former uses four educational categories and the latter, two.

The *method* of aggregation also affects results. Aggregation across education levels at the lower end of the educational distribution eliminates heterogeneity in education levels prevalent in earlier historical periods and inflates the homogamy estimates for the beginning of the time series. Conversely, aggregation at the top eliminates heterogeneity prevalent in later periods, inflating estimates of homogamy at the end of the period. To illustrate, Table 2 shows the effects of aggregating changes in the absolute rate of educational homogamy among couples where both are aged under 35 in the United States (1940 to 2000) and Canada (1971 to 2001). The first column shows the change in homogamy rates when measured with nine educational classes. Educational groupings 9, 7, 6, 5, 4a, and 3a show the effect of aggregation into fewer categories by combining the lowest with the next-lowest educational categories. When aggregation is done from the bottom up, the time trend towards rising levels of homogamy gradually disappears and is then reversed. For example, educational homogamy in the United States increases from 1940 to 1960 with nine educational categories but decreases with more aggregate groupings. In 1940, about one half of married young women and 43% of married young men had less than Grade 10 education, and much of the variation in the educational distribution was among those with few or no years of schooling, those that had completed Grade 8 and those with some high school. By 1960, in contrast, variation in education levels at the bottom of the distribution had all but disappeared. Hence, by grouping together all those with less than Grade 10, Schwartz and Mare (2005), in their estimates for 1940, conceal the actual diversity in education levels and inflate the estimated level of homogamy relative to later periods.

3. This title emulates that of Wong (2003).

Table 2 Couples with same education levels among all couples aged 34 or under, United States and Canada

	Groupings of educational categories							
	9	7	6	5	4a	4b	3a	3b
	percent							
United States								
1940	36.4	44.1	47.3	51.0	66.6	53.3	86.5	69.0
1960	38.5	40.3	41.5	44.9	53.6	50.0	76.9	58.6
1970	45.0	46.0	46.4	48.8	53.5	55.9	71.9	60.5
1980	48.9	49.3	49.5	51.0	53.2	60.8	65.7	63.0
1990	...	51.9	52.0	52.9	53.9	63.7	62.6	64.8
2000	...	53.9	54.1	54.7	55.8	67.4	62.7	68.6
Canada								
1971	...	35.4	36.3	41.8	54.0	46.3	73.5	58.4
1981	...	41.7	41.9	44.4	48.2	52.5	59.4	56.2
1991	...	49.0	49.1	50.6	52.1	59.8	60.5	61.4
2001	...	54.7	54.7	55.2	55.9	70.8	59.6	71.4

... not applicable

Notes: The various groupings of educational categories are defined as the following: 9: Grades 0 to 4, 5 and 6, 7, 8, 9, 10 and 11, 12, college 1 to 3, college 4 and over; 7: Grades 0 to 4, 5 to 8, 10 and 11, 12, college 1 to 3, college4 and over; 6: less than Grade 9, Grades 9, 10 and 11, 12, college 1 to 3, college 4 and over; 5: less than Grade 9, Grades 9 to 11, 12, college 1 to 3, college 4 and over; 4a: less than Grade 12, Grade 12, college 1 to 3, college 4 and over; 4b: less than Grade 9, Grades 9 to 11, 12, and college; 3a: less than Grade 12, Grade 12, college 1 to 3, college 4 and over; 3b: less than Grade 12, Grade 12, college. For Canada, Grade 12 is replacedby high-school graduation; college 1 to 3 is replaced by some post-secondary education without a university degree. Resultsin this table are derived from data from the sources below.

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files; University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Similarly, from 1970 on, educational homogamy in both the United States and Canada unambiguously rises with 7, 6, and 5 educational categories, changes little with the 4a groupings, but declines with the 3a groupings. In 1970, the highest level of education for most young people was high-school graduation, and crossing barriers of intermarriage for the majority of people occurred at or below high-school graduation. Thus, a fine distinction across education levels at the lower end is critical.

By 2000, in contrast, most young people had at least some post-secondary education, and crossing barriers occurred mainly at levels beyond high-school graduation. Hence, aggregating from the top down eliminates heterogeneity in educational attainment prevalent in later but not earlier periods, producing inflated levels of homogamy at the end of the series. The differences between grouping 5 and 4b and between 4a and 3b reflect the effects of aggregation at the upper end by combining "some college" with "college graduation." Thus, for later periods, a fine distinction across education levels at the upper end is important.

A suitable grouping of education levels for examining temporal changes should adequately reflect the main sources of educational heterogeneity at both the earlier and later periods. Ideally, the more detailed grouping the better. However, too much detail creates many empty cells in the cross-tabulation of wives' and husbands' education and complicates modelling. A practical solution is to choose a grouping that closely resembles more detailed groupings in revealing the trends in homogamy. In our analysis we choose the five-level classification that distinguishes between elementary school only, some high school, high-school graduation, some post-secondary

(some college in the United States) education, and university (college in the United States) graduation. The five-category grouping reveals the same trend as more detailed groupings and captures the main sources of educational heterogeneity at both the beginning and the end of the period.

3.2 First marriage versus marriage stock, and real versus synthetic cohorts

In previous studies on trends in educational homogamy, some researchers favour newly formed first marriages while others use marriage stock (see Table 1). From newly formed first marriages, husbands' and wives' educational attainment can be measured at the time close to marriage formation. This advantage makes them appropriate subjects for studying the role of education among those entering marriage for the first time. In comparison, the level of educational homogamy among marriage stock (prevailing marriages) reflects the combined effects of assortative entry into the first marriage, assortative dissolution of marriage, assortative entry into subsequent marriages, and the tendency that partners grow alike in educational attainment after marriage (Gelissen, 2004; Rogers, 2004). Kalmijn (1991b) shows that the percentage of homogamous marriages rises as a marriage cohort ages. Given the large prevalence of union dissolution and remarriage in contemporary western societies, focusing on first marriages will not reveal the overall picture of educational homogamy among prevailing marriages.

A related issue concerns the use of real versus synthetic marriage cohorts. Newly formed first marriages from repeated cross-sections with sufficient time intervals represent distinct marriage cohorts. This may not be the case for prevailing marriages. In the studies by Smits, Ultee and Lammers (2000) and Smits (2003), differences between younger and older couples from one cross-sectional data set are used to infer changes in educational homogamy. The obvious problem with such an approach is that older couples have stayed much longer in marriage than younger ones. If homogamy increases or decreases with the length of marriage, then differences between younger and older couples at least partially capture these attrition effects. When prevailing marriages from multiple cross-sectional data are compared, problems occur due to overlapping of marriage cohorts. As shown in Table 3, the trend toward rising educational homogamy among younger couples is clear in both countries. The trend is not as clear among older couples or among all marriages.[4]

4. Older and younger couples are also differentially sensitive to the grouping of education levels. In 1971, young Canadian couples (both the husband and wife are aged from 15 to 34) had a lower level of educational homogamy than older couples. This is primarily because most of the older couples were married before 1960 and the five educational categories did not adequately reflect the important barriers to intermarriage in the earlier decades. When we split those with elementary education into three categories (no education, 1 to 4 years, 5 to 8 years), older couples had a lower level of educational homogamy than the younger group in 1971 (results not shown here).

Table 3 Couples with same educational levels by age of wives and husbands, based on five educational groups, United States and Canada

	Age of husbands and wives		
	Both from 15 to 34	Either over 34	All marriages
	percent		
United States			
1970	48.8	46.2	46.9
1980	51.0	46.8	48.0
1990	52.9	47.3	48.5
2000	54.7	49.8	50.5
Canada			
1971	41.8	50.0	47.6
1981	44.4	45.2	45.0
1991	50.6	49.7	49.8
2001	55.2	50.8	51.2

Notes: The five educational groups in the United States are as follows: less than Grade 9, Grades 9 to 11, Grade 12, college 1 to 3, college 4 and over. In Canada, they are as follows: less than Grade 9, some high school, high-school graduation, some post-secondary, undergraduate degree and over. Results in this table are derived from data from the sources below.

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files; University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

In this study, our main conclusions are based on analyses of prevailing marriages among young couples in which both partners are under 35 for two reasons.[5] First, our effort to analyze first marriages (reported in Appendix A) suffers from problems of data sparsity (small sample). Second, prevailing marriages among younger couples provides a more complete picture of trends since they also take account of assortative trends in marital dissolution and remarriage. By focusing on younger couples, we also can minimize the impact of cohort overlap.

3.3 Measuring heterogeneous and overall changes in homogamy with log-linear models

Most studies of educational homogamy rely on log-linear modeling of the contingency table of wives' and husbands' education levels. For a two-way table, the log-linear model takes the general form

$$\text{Log}\,(F_{ij}^{WH}) = \lambda_0 + \lambda_i^{W} + \lambda_j^{H} + \lambda_{ij}^{WH} \quad ,$$

where, F_{ij}^{WH} refers to the expected frequency of the (i,j) cell consisting of wives with education level i and husbands with education level j. Both i and j ranges from 1 to k. λ_i^{W} captures the marginal effect of wives' educational distribution, λ_j^{H} the marginal effect of husbands' education, and λ_{ij}^{WH} captures the association between wives' and husbands' education.

The saturated model includes all the linearly independent effects: $k-1$ factors for wives' marginal effect, $k-1$ for husbands, and $(k-1)(k-1)$ for their interactions. The saturated model fits the data perfectly but does not have any extra degree of freedom for testing specific hypotheses. Accordingly, researchers use more parsimonious forms of the interaction terms. Previous studies on educational homogamy often use some variations or combinations of the following forms:

5. We also conducted a separate analysis for couples in which only the wife's age is confined to be under 35, to make sure our results are robust to sample selection given that men and women differ in the mean marriage ages. Results for couples in which the husband's age is not restricted are reported in footnotes 13 and 14.

quasi-independence (diagonal) parameters, crossings parameters, distance parameters, and quasi-symmetry parameters (see Table 1). Specifications of these parameters are well documented in the literature (e.g., Haberman, 1979; Hout, 1983).

Using five educational categories as an example, we show in Table 4 how the above four types of parameters correspond to the log odds ratio of intermarriage (or homogamy when assigned the opposite sign) between a given pair of educational categories.[6] From this table, it is clear that the four commonly used log-linear models differ only in their assumptions about the relationships in log odds ratios of intermarriage among different pairs of education levels.[7] The choice of models is typically determined empirically by goodness-of-fit statistics. As shown in Tables 12 and 13, when applied to all married couples aged under 35, the quasi-independence model fits the data poorly. Among the remaining three models, the quasi-symmetry model always has the smallest log-likelihood ratio chi-square statistic (L^2), and often the smallest BIC (Bayesian Information Criterion) value which penalizes less-parsimonious models. Accordingly, we report results based on the quasi-symmetry model since it is typically the best-fitting model when, as in our study, the sample size is sufficiently large. Furthermore, a given parameter from the quasi-symmetry model directly corresponds to a log odds ratio of intermarriage between two education levels as shown in Table 4.

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6. We want to stress that it is crucial to interpret the above parameters in terms of log odds ratio of intermarriage (homogamy) between any given pair of educational categories. This interpretation will help us interpret changes in these parameters over time. For instance, the log odds ratio of intermarriage between high-school (level 3) and university graduates (level 5) based on a quasi-independence model can be expressed as

$$\log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right) = -(\lambda_{q3} + \lambda_{q5}).$$

Similarly, the log odds ratio of intermarriage for the same combination of education levels becomes $2(\lambda_{c3} + \lambda_{c4})$ in a crossings model, $2\lambda_{d2}$ in a distance model, and $2\lambda_{s53}$ in a quasi-symmetry model. In the situation when some of these models are combined in the estimation, the log odds ratios can be derived in a similar fashion.

7. The quasi-independence model assumes a general tendency of intermarriage for each education level (λ_{qi} for level i), e.g., university graduates have a higher tendency to marry other university graduates than high-school graduates to marry other high-school graduates. In this model, the log odds ratios of intermarriage between education level i and j is the sum of the λ_{qi} and λ_{qj}. The crossings model assumes a unique barrier to intermarriage for crossing two adjacent education levels and the log odds ratio of intermarriage between two education levels depends on the selection and number of barriers crossed. The distance model assumes that the difficulty of intermarriage is the same among pairs of education levels that have the same relative distance. For instance, the relative distance between less than high school (level 1) and high-school graduation (level 3) is considered the same as the distance between high-school graduation (level 3) and university graduation (level 5). In contrast, the quasi-symmetry model does not assume any relationship among pairs of education levels. Since the quasi-symmetry model imposes few restrictions on the parameter estimates, it is less parsimonious than other models but often fits the data better.

We further add a hypergamy parameter to examine the possibility that, with a given education level, women are more likely than men to marry up (or down) the educational hierarchy.[8] Rather than assume women and men have the same tendency to marry up (or down), the hypergamy parameter essentially allows us to test for asymmetry in male–female rates of intermarriage.
In sum, we use quasi-symmetry parameters and a hypergamy parameter to capture the association between wives' and husbands' education. Building on this base model, we examine how such an association has changed over time in terms of overall trends, and trends specific to the highly educated and less well educated, and trends specific to women and men.

To answer our first research question regarding trends in the overall rate of educational marital homogamy, we can choose from various modelling strategies including Yamaguchi's (1987) uniform layer effect model, Xie's (1992) log-multiplicative layer effect model, and the regression-type approach proposed by Goodman and Hout (1998). We use the log-multiplicative layer effect model since it allows greater parsimony than the regression approach and defines layer (time period) effects by directly comparing the pre-defined pattern of the two-way association between husbands and wives' education (in our case, the quasi-symmetry pattern plus hypergamy), which is not the case in the uniform layer effect model.[9]

8. In the log-linear model, the hypergamy variable is coded simply as 1 when a woman marries a better-educated man and 0 when a woman marries a man withthe same or less education.
9. We estimated both the log-multiplicative layer model and the uniform layer effect model. The results showed similar trends.

Table 4 Parameters and their interpretations in some log-linear models of educational assortative marriage

Parameters						Log odds ratios of intermarriage between two education levels			
1. Quasi-independence model									
	Husband's education level					Husband's education level			
Wife's[1]	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)
(1)	λ_{q1}	0	0	0	0				
(2)	0	λ_{q2}	0	0	0	$-(\lambda q1+\lambda q2)$			
(3)	0	0	λ_{q3}	0	0	$-(\lambda_{q1}+\lambda_{q3})$	$-(\lambda_{q2}+\lambda_{q3})$		
(4)	0	0	0	λ_{q4}	0	$-(\lambda q1+\lambda q4)$	$-(\lambda_{q2}+\lambda_{q4})$	$-(\lambda_{q3}+\lambda_{q4})$	
(5)	0	0	0	0	λ_{q5}	$-(\lambda q1+\lambda q5)$	$-(\lambda_{q2}+\lambda_{q5})$	$-(\lambda_{q3}+\lambda_{q5})$	$-(\lambda_{q4}+\lambda_{q5})$
2. Crossings model									
	Husband's education level					Husband's education level			
Wife's[1]	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)
(1)	0	λ_{c1}	$\lambda_{c1}+\lambda_{c2}$	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}$	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$				
(2)	λ_{c1}	0	λ_{c2}	$\beta_{c2}+\beta_{c3}$	$\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$2\lambda_{c1}$			
(3)	$\lambda_{c1}+\lambda_{c2}$	λ_{c2}	0	λ_{c3}	$\lambda_{c3}+\lambda_{c4}$	$2(\lambda_{c1}+\lambda_{c2})$	$2\lambda_{c2}$		
(4)	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}$	$\lambda_{c2}+\lambda_{c3}$	λ_{c3}	0	λ_{c4}	$2(\lambda_{c1}+\lambda_{c2}+\lambda_{c3})$	$2(\lambda_{c2}+\lambda_{c3})$	$2\lambda_{c3}$	
(5)	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$\lambda_{c3}+\lambda_{c4}$	λ_{c4}	0	$2(\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4})$	$2(\lambda_{c2}+\lambda_{c3}+\lambda_{c4})$	$2(\lambda_{c3}+\lambda_{c4})$	$2\lambda_{c4}$
3. Distance model									
	Husband's education level					Husband's education level			
Wife's[1]	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)
(1)	0	λ_{d1}	λ_{d2}	λ_{d3}	λ_{d4}				
(2)	λ_{d1}	0	λ_{d1}	λ_{d2}	λ_{d3}	$2\lambda_{d1}$			
(3)	λ_{d2}	λ_{d1}	0	λ_{d1}	λ_{d2}	$2\lambda_{d2}$	$2\lambda_{d1}$		
(4)	λ_{d3}	λ_{d2}	λ_{d1}	0	λ_{d1}	$2\lambda_{d3}$	$2\lambda_{d2}$	$2\lambda_{d1}$	
(5)	λ_{d4}	λ_{d3}	λ_{d2}	λ_{d1}	0	$2\lambda_{d4}$	$2\lambda_{d3}$	$2\lambda_{d2}$	$2\lambda_{d1}$
4. Quasi-symmetry model									
	Husband's education level					Husband's education level			
Wife's[1]	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)
(1)	0	$\lambda_{\tau 21}$	$\lambda_{\tau 31}$	$\lambda_{\tau 41}$	$\lambda_{\tau 51}$				
(2)	$\lambda_{\tau 21}$	0	$\lambda_{\tau 32}$	$\lambda_{\tau 42}$	$\lambda_{\tau 52}$	$2\lambda_{\tau 21}$			
(3)	$\lambda_{\tau 31}$	$\lambda_{\tau 32}$	0	$\lambda_{\tau 43}$	$\lambda_{\tau 53}$	$2\lambda_{\tau 31}$	$2\lambda_{\tau 32}$		
(4)	$\lambda_{\tau 41}$	$\lambda_{\tau 42}$	$\lambda_{\tau 43}$	0	$\lambda_{\tau 54}$	$2\lambda_{\tau 41}$	$2\lambda_{\tau 42}$	$2\lambda_{\tau 43}$	
(5)	$\lambda_{\tau 51}$	$\lambda_{\tau 52}$	$\lambda_{\tau 53}$	$\lambda_{\tau 54}$	0	$2\lambda_{\tau 51}$	$2\lambda_{\tau 52}$	$2\lambda_{\tau 53}$	$2\lambda_{\tau 54}$

1. Wife's education level.

Notes: Education levels in the United States are as follows: (1) Less than Grade 9, Grades 9 to 11; (2) Grade 12; (3) College 1 to 3; (4) College 4 and over. In Canada they are as follows: (1) Less than Grade 9; (2) Some high school; (3) High-school graduation; (4) Some post-secondary; (5) Undergraduate degree and over.

To answer our second questions regarding changes across education levels, we rely on the interaction terms between quasi-symmetry parameters and time periods. The change in a given quasi-symmetry parameter can be expressed as the difference of two log odds ratios or the log of the ratio of odds ratios. For instance, the change in λ_{s53}, which is one half the log odds ratio of intermarriage between high-school graduation and university graduation, can be expressed as

$$\lambda_{s53\,t2} - \lambda_{s53\,t1} = \frac{1}{2}\left[\log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t2} - \log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t1}\right] = \frac{1}{2}\log\left[\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t2} \div \left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t1}\right].$$

Thus, a positive change in λ_{sij} indicates an increase in the tendency of women and men with education levels i and j to marry across their own education levels (or a decrease in homogamy). Alternatively, a negative change in λ_{sij} indicates a decrease in the tendency of women and men with education levels i and j to marry across education levels.

To answer our third question regarding gender-specific trends, we further add the interaction terms between the hypergamy parameter (λ_h) and time periods. In this model, where the change in hypergamy is controlled, the change in a given quasi-symmetry parameter over time $\lambda_{sij\,t2} - \lambda_{sij\,t1}$, assuming i is a higher education level than j, is the change in the log odds ratio of marring down the education hierarchy among women. Meanwhile, the change in the log odds ratio of marrying down the education hierarchy among men is $(\lambda_{sij\,t2} - \lambda_{sij\,t1}) + (\lambda_{h\,t2} - \lambda_{h\,t1})$.[10]

4. Data sources

The data for prevailing marriages among young adults aged under 35 were derived from the 1970, 1980, 1990, and 2000 U.S. Census public use sample from the Integrated Public Use Microdata Series (Ruggles et al., 2003). The U.S. Census does not explicitly differentiate legal marriage from common-law unions. Beginning in 1980, couples who lived together but were not legally married were allowed to report the marital status they considered the most appropriate. Therefore, marriages from the U.S. Census include an increasing proportion of common-law unions starting from 1980. For Canada, the data are derived from the 1971 Census 33% sample microdata file, and 20% sample microdata files for the decennial census years from 1981 to 2001. Beginning in 1981, legal marriages and common-law unions are distinguished in the Census of Canada. We estimated our Census of Canada results separately for all unions (legal marriages and common-law marriages) and legal marriages only, to see whether they differ in the trend in educational homogamy. Since differences were invariably trivial, we only report results for all unions. For both countries, we only consider marriages among the white population since racial intermarriages may involve unique pattern of educational matching (Kalmijn, 1991a).

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10. For example, $\lambda_{s53\,t2} - \lambda_{s53\,t1}$ is the change in log odds of intermarriage between university educated and high-school graduates $\frac{1}{2}\left[\log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t2} - \log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t1}\right] = (\lambda_{s53\,t2} - \lambda_{s53\,t1}) + (\lambda_{h\,t2} - \lambda_{h\,t1})$, when university-educated women marry men with high-school graduation, both $\lambda_{h\,t2}$ and $\lambda_{h\,t1}$ equal 0 since the hypergamy variable equals 0 when women marry down the educational hierarchy. But for university-educated men marrying women with high-school graduation, the change in $\lambda_{h\,t2}$ has to be taken into account since the hypergamy variable equals 1 when women marry upthe educational hierarchy.

As shown in Tables 5 and 6, the sample size ranges from 109,630 to 611,080 marriages in the United States and from 100,740 to 386,720 in Canada. Following common practice in the literature (e.g., Raymo and Xie, 2000), we scaled down the sample size to about 100,000 (the smallest yearly sample size in our data) for each year in the subsequent modeling.[11] The rescaled sample is small enough that our chosen parsimonious quasi-symmetry model can fit the data reasonably well (with negative BIC [Bayesian Information Criterion] statistic) for any given year (as shown in Tables 12 and 13).

5. Results

5.1 Changes in absolute rates: Educational homogamy among the married

Tables 5 and 6 show the percentage distribution of wives' and husbands' level of education and changes in *absolute* rates of homogamy and intermarriage among prevailing marriages for young adults aged under 35 in the United States (from 1970 to 2000) and Canada (from 1971 to 2001).

Average educational attainment rose for both sexes over the three decades, particularly for women (the column totals). By 2000 and 2001, wives had higher average education levels than their husbands in both countries. Starting from a lower base, the gains were larger among Canadians, and particularly among Canadian wives.[12] By 2001, the gender gap in the share of husbands and wives with university degrees was 5 percentage points in Canada (23.7% for women and 18.8% for men) compared to a 2.5-percentage-point gap in 2000 in the United States (27.9% for women and 25.4% for men). Canadians were less likely to have completed a university degree than Americans but much more likely than Americans to have some post-secondary schooling.

Among prevailing marriages, the percentage of educationally homogamous couples (the sum of diagonal cells in Tables 5 and 6) increased steadily in both countries, and by 2000 and 2001, young couples had a similar level of educational homogamy in the two countries. In the United States, some 55% of marriages consisted of couples with the same level of education in 2000, up from 49% in 1970. In Canada, 54% of couples had the same level of education in 2001, up from 42% in 1971.[13] The U.S. rate increased by about 2 percentage points per decade. In Canada, the rate rose by 2.6 percentage points in the 1970s and then accelerated to 6 percentage points in the 1980s and about 5 percentage points in the 1990s.

11. We also use both larger and smaller rescaled sample sizes to test the sensitivity of our results. The parameter estimates based on different rescaled sample sizes are very similar in value, but are more likely to be significant with larger sample sizes.
12. Change in the marginal distributions of education for husbands and wives as indexed by the index of dissimilarity are as follows: U.S. wives, 0.37; Canadian wives, 0.55; U.S. husbands, 0.22; Canadian husbands, 0.38.
13. Among legal marriages the corresponding change was from 42% in 1971 to 44% in 1981, 51% in 1991, and 55% in 2001. Among unions in which the wife's age is under 35 while the husband's age is not restricted, the change was from 42% in 1971 to 43% in 1981, 49% in 1991, and 53% in 2001. See footnote 5.

Table 5 Assortative mating on educational attainment for all married couples aged under 35, United States, 1970, 1980, 1990 and 2000

Wife's years of schooling	Husband's years of schooling					Total	Sum of diagonals
	< 9	9 to 11	12	13 to 15	> = 16		
	percent						
1970							
< 9	2.7	1.7	1.3	0.2	0.1	6.0	
9 to 11	2.9	6.5	7.3	1.2	0.3	18.2	
12	2.5	7.4	26.9	8.8	4.6	50.2	
13 to 15	0.2	0.7	3.7	5.1	5.3	15.0	
> = 16	0.1	0.2	1.0	1.7	7.7	10.6	
Total	8.5	16.4	40.1	17.0	18.0	100.0	48.8
Sample size						109,632	
1980							
< 9	1.4	0.9	0.8	0.2	0.1	3.4	
9 to 11	1.3	3.9	5.3	1.2	0.2	12.0	
12	1.3	5.0	26.0	10.2	4.6	47.1	
13 to 15	0.2	0.7	5.5	8.0	6.9	21.2	
> = 16	0.1	0.1	1.5	2.9	11.7	16.3	
Total	4.3	10.7	39.1	22.5	23.5	100.0	51.0
Sample size						611,076	
1990							
< 9	1.0	0.5	0.5	0.2	0.0	2.1	
9 to 11	0.6	2.6	3.6	1.0	0.1	7.9	
12	0.7	3.9	22.1	9.1	2.3	38.0	
13 to 15	0.2	1.3	10.1	14.7	6.4	32.7	
> = 16	0.0	0.2	2.1	4.5	12.5	19.2	
Total	2.5	8.5	38.3	29.4	21.3	100.0	52.8
Sample size						496,373	
2000							
< 9	1.4	0.5	0.6	0.2	0.0	2.8	
9 to 11	0.6	2.1	2.6	0.8	0.1	6.2	
12	0.8	2.9	16.7	6.9	1.6	28.8	
13 to 15	0.3	1.4	10.4	16.6	5.8	34.4	
>=16	0.1	0.2	2.8	7.0	17.9	27.9	
Total	3.2	7.1	33.0	31.4	25.4	100.0	54.7
Sample size						354,061	

Source: University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Table 6 Assortative marriage on educational attainment for all married couples aged under 35, Canada, 1971, 1981, 1991 and 2001

Wife's years of schooling	Legal marriages and common law husband's years of schooling						Legal marriages husband's years of schooling					
	(1)	(2)	(3)	(4)	(5)	Total	(1)	(2)	(3)	(4)	(5)	Total
1971												
(1) < grade 9	8.8	4.9	1.6	1.3	0.1	16.6	8.8	4.9	1.6	1.3	0.1	16.6
(2) Some high school	7.3	15.1	7.2	4.5	1.0	35.0	7.3	15.1	7.2	4.5	1.0	35.0
(3) High-school graduation	2.7	8.2	9.9	6.5	2.5	29.7	2.7	8.2	9.9	6.5	2.5	29.7
(4) Some post-secondary	0.9	2.2	2.6	5.1	3.8	14.5	0.9	2.2	2.6	5.1	3.8	14.5
(5) University degree +	0.1	0.2	0.3	0.7	3.0	4.2	0.1	0.2	0.3	0.7	3.0	4.2
Total	19.7	30.5	21.5	18.0	10.3	100.0	19.7	30.5	21.5	18.0	10.3	100.0
Sum of diagonals						41.8						41.8
Sample size						386,723						386,723
1981												
(1) < grade 9	1.8	1.4	0.8	0.9	0.1	5.0	2.0	1.4	0.8	1.0	0.1	5.2
(2) Some high school	2.5	10.9	4.5	7.6	0.6	26.0	2.4	10.3	4.4	7.6	0.6	25.3
(3) High-school graduation	1.2	5.1	8.4	9.7	1.4	25.8	1.2	4.8	8.5	10.0	1.5	26.1
(4) Some post-secondary	0.9	5.1	5.4	17.5	5.4	34.2	0.8	4.8	5.4	17.6	5.6	34.2
(5) University degree +	0.0	0.3	0.5	2.5	5.7	9.0	0.0	0.3	0.5	2.5	6.0	9.3
Total	6.4	22.7	19.6	38.2	13.1	100.0	6.4	21.6	19.6	38.7	13.7	100.0
Sum of diagonals						44.3						44.4
Sample size						318,036						275,674
1991												
(1) < grade 9	0.7	0.7	0.3	0.3	0.0	2.0	0.7	0.6	0.3	0.3	0.0	1.8
(2) Some high school	1.1	9.4	3.4	4.8	0.3	19.0	1.0	8.6	3.0	4.8	0.3	17.7
(3) High-school graduation	0.6	4.8	9.3	7.9	0.9	23.5	0.6	4.5	9.4	8.5	1.0	24.0
(4) Some post-secondary	0.6	6.2	8.0	23.6	4.7	43.1	0.6	5.6	7.9	24.2	5.1	43.4
(5) University degree +	0.0	0.4	1.0	4.1	6.9	12.4	0.0	0.4	0.9	4.2	7.5	13.1
Total	3.1	21.5	21.9	40.7	12.9	100.0	2.9	19.6	21.6	42.0	13.9	100.0
Sum of diagonals						50.0						50.5
Sample size						264,339						197,607
2001												
(1) < grade 9	0.6	0.3	0.2	0.2	0.0	1.3	0.7	0.2	0.1	0.2	0.0	1.2
(2) Some high school	0.6	5.5	1.9	3.3	0.2	11.5	0.4	4.3	1.5	3.1	0.2	9.4
(3) High-school graduation	0.4	2.5	5.4	5.2	0.6	13.9	0.3	1.9	5.1	5.3	0.7	20.8
(4) Some post-secondary	0.6	5.8	8.1	29.9	5.3	49.6	0.4	4.9	8.0	30.2	6.0	42.0
(5) University degree +	0.1	0.6	1.4	8.9	12.7	23.7	0.0	0.6	1.5	9.6	14.9	26.6
Total	2.2	14.6	16.9	47.5	18.8	100.0	1.8	12.0	16.1	48.4	21.7	100.0
Sum of diagonals						54.0						55.2
Sample size						173,179						100,744

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files.

Tables 7 and 8 show the detailed trends in homogamy and intermarriage for men and women separately by education level for the United States and Canada respectively. The total homogamy rate rose among women in both countries but the trend was driven mainly by the sharp increase among women with some post-secondary education. The average trend, however, was offset by a decline in homogamous marriages among university-educated women—a decline of 8 percentage points in the United States and almost 17 percentage points in Canada. By 2001, only 54% of young Canadian university-educated married women had partners with university degrees. Less-educated women, in contrast, were somewhat more likely to marry up in 2001 than in 1971.

Not surprisingly the trends for men tend to be the mirror image of those for women. Rates of homogamy and marrying 'up' rose sharply for better-educated men, and by 2000 and 2001, well-educated men were more likely to have a highly educated partner than were highly educated women, reversing the situation of 1970 and 1971. Among less-educated men, rates of homogamy actually declined (except for those with less than nine years of schooling in the United States) because of a dramatic increase in the share marrying better-educated women. The share of male high-school graduates marrying better-educated women, for example, rose from 12% to 40% in the United States and from 13% to 56% in Canada over the three decades. In 1970 and 1971, women with high-school completion were much more likely than men to marry up. By 2000 and 2001, the advantage had turned decisively to men. Overall, rising education levels have improved the marriage market for men much more than for women.

Table 7 Changes in upward, downward and homogamous marriage, by sex and education level, United States, 1970, 1980, 1990 and 2000

	Wife's years of schooling						Husband's years of schooling					
	< 9	9 to 11	12	13 to 15	>= 16	Total	< 9	9 to 11	12	13 to 15	>= 16	Total
	% of marriage within an education level in a given year						% of marriage within an education level in a given year					
Up												
1970	54.6	48.2	26.8	35.6	...	29.3	67.7	49.8	11.8	9.9	...	20.5
1980	59.9	56.4	31.4	32.4	...	28.1	67.5	54.5	17.8	13.0	...	20.0
1990	55.1	59.5	29.8	19.6	...	22.0	61.9	63.5	31.8	15.1	...	23.4
2000	47.6	55.4	29.4	16.8	...	20.4	54.6	63.2	39.9	22.2	...	24.5
Homogamous												
1970	45.4	35.8	53.5	33.7	72.3	49.9	32.3	39.7	66.9	29.7	42.6	51.7
1980	40.1	32.9	55.2	37.6	72.0	52.2	32.5	36.9	66.5	35.5	49.8	52.5
1990	44.9	33.3	58.0	45.0	65.0	53.2	38.1	30.9	57.6	50.1	58.6	52.8
2000	52.4	34.4	57.9	48.2	64.1	54.2	45.4	29.7	50.5	53.0	70.4	55.5
Down												
1970	...	16.0	19.7	30.7	27.7	20.7	...	10.5	21.3	60.4	57.4	27.7
1980	...	10.7	13.4	30.0	28.0	19.7	...	8.6	15.7	51.5	50.2	27.5
1990	...	7.2	12.2	35.4	35.0	24.8	...	5.6	10.6	34.8	41.4	23.8
2000	...	10.2	12.7	35.0	35.9	25.4	...	7.1	9.6	24.8	29.6	20.0

... not applicable

Source: University of Minnesota, Minnesota Population Center, 1970-to-2000 U.S. Census public use microdata files.

Table 8 Changes in upward, downward and homogamous marriage, by sex and education level, Canada, 1971, 1981, 1991 and 2001

	Wives Years of Schooling						Husbands Years of schooling					
	< 9	9 to 11	12	13 to 15	>= 16	Total	< 9	9 to 11	12	13 to 15	>= 16	Total
	% of marriage within an educational level in a given year						% of marriage within an educational level in a given year					
Up												
1971	47.1	36.1	30.1	26.0	...	31.4	55.3	34.6	13.3	3.9	...	25.8
1981	63.3	48.8	43.3	15.7	...	29.6	71.0	45.9	30.1	6.5	...	25.5
1991	63.6	44.4	37.5	10.9	...	24.2	77.0	52.9	40.9	10.0	...	25.5
2001	53.7	47.4	41.4	10.8	...	20.2	71.4	60.4	55.9	18.7	...	24.9
Homogamous												
1971	52.9	43.0	33.4	34.9	71.2	44.3	44.7	49.5	46.1	28.0	28.7	43.7
1981	36.7	41.8	32.6	51.1	63.3	46.1	29.0	47.9	42.9	45.8	43.2	44.5
1991	36.4	49.6	39.5	54.8	55.9	49.9	23.0	44.0	42.5	58.0	53.9	50.5
2001	46.3	47.6	38.5	60.2	53.7	53.2	28.6	37.3	31.6	62.9	67.6	56.3
Down												
1971	...	20.9	36.5	39.1	28.8	24.2	...	15.9	40.6	68.1	71.3	30.5
1981	...	9.4	24.1	33.2	36.7	24.4	...	6.2	27.0	47.7	56.8	30.0
1991	...	6.0	23.0	34.3	44.1	25.9	...	3.1	16.6	32.0	46.1	24.0
2001	...	5.0	20.1	29.0	46.3	26.6	...	2.3	12.5	18.4	32.4	18.8

... not applicable

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample micro-data files.

5.2 Changes in relative rates

Given the larger gains in wives' educational attainment, changes observed in the absolute rates may not appear especially surprising. In 1970 and 1971, husbands were on average much better educated than wives while in 2000 and 2001, wives were better educated than husbands. The convergence of wives' education on that of husbands increased the possibility of forming homogamous unions. As wives surpassed the educational attainments of husbands, the likelihood that more women would marry down increased as did the likelihood that husbands would marry better-educated women. Testing the modernization thesis, for example, requires estimation of changes in relative rates, net of changes in the educational distributions of men and women.

Table 9 summarizes the model goodness-of-fit estimates for various steps of the log-linear estimation. The starting model (M0) includes only the marginal values for husbands' and wives' education and period but assumes no association between the education of husbands and wives, and no association between time period and the association between husbands' and wives' education. Model one (M1) adds parameters for the quasi-symmetry model of association between husbands' and wives' education and a hypergamy (the tendency for wives to marry up) parameter, but assumes that the associations do not change over time. Introduction of the hypergamy parameter essentially allows the model to estimate different parameters for husbands and wives, whether men and women at the same education level have the same tendency to marry within or to marry out. For both countries, the model (M1) with quasi-symmetry and hypergamy parameters significantly improves the model fit relative to the baseline model that assumes no association between husbands' and wives' education.

Table 9 Goodness-of-fit results for models of all marriages among young adults, Canada and United States

	United States			Canada, legally married and common law			Canada, legally married		
	d.f.	L^2	BIC	d.f.	L^2	BIC	d.f.	L^2	BIC
M0: Baseline model	64	199833	199007	64	150566	149829	64	153072	152246
M1: M0 + Quasi symmetry + hypergamy	53	1252	568	53	2104	1420	53	2748	2064
M2: M1 + log-multiplicative layer effect	50	966	321	50	1502	857	50	2006	1360
M3: M1 + Quasi symmetry*period	23	254	-43	23	220	-77	23	257	-40
M4: M3 + hypergamy*period	20	134	-124	20	204	-54	20	221	-37

Notes: The baseline model contains the main effects of wives' education, husbands' education, and period; and two-way interactions between period and education for each sex. L^2 is the log-likelihood ratio chi-square statistic; d.f. is the degree of freedom; BIC is the Bayesian Information Criterion. $BIC = L^2 - (d.f.)\ln(N)$, where N is the rescaled sample size (401,282 for the United States and 402,499 for Canada).

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files; University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Change in relative rates of homogamy

Model two (M2) adds the log-multiplicative layer effect to the model (M1) with quasi-symmetry and hypergamy parameters, and provides the parameter values (the normalized Φ parameter) that answer the question of whether or not the relative rate of homogamy has changed over time. The log-multiplicative layer effect model (M2) has the best fit based on the BIC (Bayesian Information Criterion) statistic in Canada and improves the model fit by the standard of the log-likelihood ratio chi-square statistic in both countries.

The log-multiplicative layer effect model (M2) tests for the 'average' or 'overall' change in the relative homogamy rate over time. The results confirm a steady increase in the relative rates of educational homogamy. The normalized Φ parameter for the United States rose from 0.48 in 1970, to 0.49 in 1980, to 0.51 in 1990, and to 0.53 in 2000. In Canada, Φ for all unions increased from 0.45 in 1971, to 0.47 in 1981, to 0.53 in 1991, and to 0.54 in 2001.[14] In effect, in both countries, the relative rate of marital homogamy increased unambiguously over all three decades.

Importantly, the predicted values for marital homogamy, net of changes in the marginals, indicate that most of the increase was due to *change in the association* between husbands' and wives' education rather than to *changes in the distribution* of husbands' and wives' education. In the United States, the change in association, net of changes in the marginals, accounts for 4 percentage points of the 6-percentage-point increase in educational homogamy from 1970 to 2000. In Canada, the change in association accounts for almost 10 percentage points of the 12-percentage-point increase. In other words, most of the increase in educational homogamy over the three decades is not a result of changes in the relative supply of husbands and wives with different education levels.

Changes in the odds of crossing educational boundaries

The heterogeneous change model (M3) generates parameters required to answer questions concerning where in the educational hierarchy the rise in homogamy is being produced (i.e., are the changes at different education levels the same or different.). M3 improves the model fit further by the standard of the log-likelihood ratio chi-square statistic and BIC (Table 9). Finally, Model 4 (M4) asks whether the change in the subcomponents differs among husbands and wives by testing for change in the hypergamy parameter. The inclusion of changes in the hypergamy parameter also improves the model fit further, although it is not as parsimonious as M3 for the Canadian data. The parameter estimates for both M3 and M4 are presented in Table 14.

To facilitate interpretation, we transform the parameter estimates in M3 and M4 into the odds of intermarriage relative to the odds of a homogamous marriage by period and present them in Table 10 for the United States and in Table 11 for Canada. Each table contains three panels titled separately as "Overall" (first panel), "Wives marrying down" (second panel), and "Husbands marrying down" (third panel). The odds ratios in the first panel are derived from M3 which assumes change in intermarriage is symmetrical with respect to sex. The odds ratios in the

14. Among legal marriages the corresponding change was from 0.44 in 1971 to 0.47 in 1981, 0.54 in 1991, and 0.55 in 2001. Among all unions in which the wife's age is under 35 while the husband's age is not restricted, the change was from 0.46 in 1971, to 0.47 in 1981, 0.53 in 1991, and 0.54 in 2001.

second and third panels are derived from M4 which specifies that men and women experience different changes in intermarriage.

In both countries, intermarriage across education levels occurs primarily between adjacent education levels, and the odds ratios for intermarriage are very small when wives and husbands are separated by more than one education level. Since the odds of intermarriage across more than one education level are very small, their changes over time have minimum impact on the overall trends in educational homogamy. Hence, our summary of findings will focus primarily on changes in intermarriage across adjacent education levels.

Declining intermarriage at the top of the educational hierarchy

In both Canada and the United States, declining intermarriage among university graduates was a major source of the overall rise in educational homogamy. In Canada, the relative rate of intermarriage between the university educated and those with some university fell by 38% (from 0.201 to 0.125) and in the United States by 45% (from 0.249 to 0.136). The largest declines occurred in Canada during the 1970s and in the United States during the 1980s. In Canada, the downward trend was arrested in the 1990s, and rates of intermarriage by the university educated actually rose slightly by 2001.

Table 10 Odds of intermarriage relative to odds of homogamy among prevailing marriages, United States, 1970, 1980, 1990 and 2000

	Overall Spouse's years of schooling				Wives marrying down Husband's years of schooling				Husbands marrying down Wife's years of schooling			
	< 9	9 to 11	12	13 to 15	< 9	9 to 11	12	13 to 15	< 9	9 to 11	12	13 to 15
1970												
9 to 11 (years)	0.282	...	...	...	0.199	...	...	...	0.287	...	...	...
12	0.043	0.304	...	...	0.029	0.212	...	...	0.042	0.304	...	...
13 to 15	0.003	0.025	0.248	...	0.002	0.018	0.169	...	0.003	0.026	0.243	...
> = 16	0.0003	0.001	0.021	0.249	0.0002	0.001	0.015	0.168	0.0003	0.001	0.022	0.242
1980												
9 to 11 (years)	0.218	...	...	...	0.170	...	...	...	0.220	...	...	...
12	0.031	0.259	...	...	0.024	0.201	...	...	0.031	0.259	...	...
13 to 15	0.004	0.027	0.270	...	0.003	0.021	0.208	...	0.004	0.028	0.268	...
> = 16	0.0002	0.001	0.021	0.219	0.0002	0.0004	0.017	0.168	0.0003	0.001	0.022	0.217
1990												
9 to 11 (years)	0.106	...	...	...	0.093	...	...	...	0.106	...	...	...
12	0.017	0.243	...	...	0.015	0.213	...	...	0.017	0.243	...	...
13 to 15	0.003	0.032	0.283	...	0.002	0.029	0.249	...	0.003	0.032	0.283	...
> = 16	0.0001	0.001	0.017	0.155	0.0001	0.001	0.015	0.137	0.0001	0.001	0.017	0.156
2000												
9 to 11 (years)	0.106	...	...	...	0.110	...	...	...	0.105	...	...	...
12	0.019	0.212	...	...	0.020	0.220	...	...	0.019	0.211	...	...
13 to 15	0.002	0.029	0.259	...	0.002	0.032	0.268	...	0.002	0.030	0.257	...
> = 16	0.0001	0.0005	0.014	0.136	0.0001	0.001	0.016	0.142	0.0001	0.001	0.015	0.136

...not applicable
Note: Results were derived by the authors from the source below.
Source: University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Whereas Canadian trends were quite similar for men and women, the U.S. decline was almost entirely driven by declining intermarriage among university-educated men (from 0.242 to 0.136, or 44%). The decline in intermarriage among U.S. university-educated women (from 0.168 to 0.142, or 15%) was modest by comparison and, as in Canada, stabilized and even rose slightly during the 1990s.

Trends in the middle

In the United States, the odds ratios of intermarriage between those with *some post-secondary* education and *high-school graduates* rose from 1970 to 1990 (from 0.248 to 0.283), falling back to 0.259 by 2000. The U.S. trends were very different for men and women however. The odds ratios of intermarriage among women rose by 59% (from 0.169 to 0.268). Among men, the odds ratios of intermarriage rose moderately (from 0.243 to 0.283) from 1970 to 1990, before falling back to 0.257 in 2000. In Canada, intermarriage rose during the 1970s but then declined substantially over the following two decades for a net decline of 12%, and changes were quite similar among women and men.

Table 11 Odds of intermarriage relative to odds of homogamy among prevailing marriages, Canada, 1971, 1981, 1991 and 2001

	Overall				Wives marrying down				Husbands marrying down			
	Spouse's years of schooling				Husband's years of schooling				Wive's years schooling			
	< 9	9 to 11	12	13 to 15	< 9	9 to 11	12	13 to 15	< 9	9 to 11	12	13 to 15
1971												
9 to 11 (years)	0.268	...	...	...	0.251	...	...	...	0.269	...	...	...
12	0.047	0.392	...	...	0.044	0.366	...	...	0.047	0.393	...	...
13 to 15	0.025	0.130	0.339	...	0.023	0.122	0.313	...	0.025	0.130	0.336	...
>= 16	0.0002	0.003	0.021	0.201	0.0002	0.003	0.019	0.186	0.0002	0.003	0.021	0.199
1981												
9 to 11 (years)	0.179	...	...	...	0.168	...	...	...	0.179	...	...	...
12	0.057	0.249	...	...	0.053	0.234	...	...	0.056	0.249	...	...
13 to 15	0.025	0.201	0.363	...	0.023	0.189	0.339	...	0.025	0.202	0.362	...
>= 16	0.0001	0.003	0.013	0.137	0.0001	0.002	0.012	0.128	0.0001	0.003	0.013	0.137
1991												
9 to 11 (years)	0.114	...	...	...	0.116	...	...	...	0.113	...	...	...
12	0.028	0.184	...	...	0.029	0.187	...	...	0.028	0.183	...	...
13 to 15	0.010	0.133	0.288	...	0.010	0.136	0.295	...	0.010	0.133	0.288	...
>= 16	0.0001	0.002	0.014	0.118	0.0001	0.002	0.014	0.120	0.0001	0.002	0.013	0.118
2001												
9 to 11 (years)	0.057	...	...	...	0.059	...	...	...	0.057	...	...	...
12	0.019	0.163	...	...	0.020	0.170	...	...	0.019	0.162	...	...
13 to 15	0.006	0.116	0.264	...	0.007	0.122	0.276	...	0.006	0.116	0.263	...
>= 16	0.0001	0.002	0.012	0.125	0.0001	0.002	0.012	0.131	0.0001	0.002	0.012	0.125

...not applicable.

Note: Results were derived by the authors from the source below.

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files.

From 1970 to 2000, the odds ratios of intermarriage between *high-school graduates* and those with some *high school* fell from 0.304 to 0.212 (30%) in the United States but the overall trend was entirely driven by high-school men. Among high-school women, the odds ratios of intermarriage with men with some high school actually rose slightly from 0.212 to 0.220 in the same period. In Canada, the decline in intermarriage between high-school graduates and those with some high school was even more precipitous, falling by 58% (from 0.392 to 0.163) from 1971 to 2001, and trends were very similar for men and women.

Intermarriage at the bottom

Declines in the odds ratio of intermarriage between those with some high school and those with less than high school were uniformly large in both Canada and the United States for both men and women. In the United States, the odds ratio of intermarriage between those with less than 9 years of schooling and those with 9 to 11 years of schooling decreased 62%, from 0.282 in 1970 to 0.106 in 2000. The decline in the odds ratio of intermarriage among the least educated was much larger among husbands than among wives. The odds ratio of marrying down among those with 9 to 11 years of schooling declined 63% among husbands (from 0.287 to 0.105), compared with a decline of 45% among wives. Thus, the chance of the least-educated wives marrying up declined faster than that of least-educated husbands.

In Canada, the odds of intermarriage between those with 9 to 11 years of schooling and those with less than 9 years of schooling decreased 79% from 1971 to 2001, and the decline was similar in magnitude among men and women.

6. Conclusion

Our analysis of prevailing marriages among young adults reveals several clear trends in educational homogamy and intermarriage in the United States and Canada. First, the overall level of both absolute and relative rates of educational homogamy have unambiguously increased in both countries over the three decades, and we find no evidence for the asymmetric inverted-U shape reported in some previous studies. Second, the overall trend at the national level appears to have been driven mainly by changes in the association of husbands' and wives' education rather than by changes in the relative supply of more- and less-educated partners.

Declining odds of intermarriage at both the top and the bottom of the educational hierarchy were major drivers of the rising rate of marital homogamy in both countries, but two important differences stand out. Declining rates of intermarriage between high-school graduates and those with both higher and lower levels of education were much larger in Canada. Indeed the odds ratios of intermarriage between those with some university education and high-school graduates actually increased in the United States. Second, while changing patterns of intermarriage were quite similar among Canadian men and women, changes among U.S. men and women differed in important ways. The declining odds of marrying down among university graduates were predominantly a male phenomenon in the United States, while rising intermarriage with high-school graduates by those with some post-secondary education occurred mainly among women. Finally, the odds of marrying down among female high-school graduates rose slightly over the period, but fell among male school graduates. Put somewhat differently, in the United States, the

prospect of marrying up the educational hierarchy improved substantially for male high-school graduates and males with less than high school and, compared to women, declined only modestly for men with some post-secondary education.

There were two important exceptions to the general trend towards rising homogamy. The first was the aforementioned increase in intermarriage between those with some post-secondary education and high-school graduates in the United States. The second was the stabilization and/or small gains in intermarriage in the 1990s among male and female university graduates in Canada and among female university graduates in the United States.
Extrapolating from either the overall trend or the exceptions to it in order to draw strong conclusions concerning prevailing theoretical accounts of trends is, however, a hazardous exercise. We are skeptical about drawing strong conclusions concerning the signal that changes in relative rates provide with respect to changes in marital *preferences* versus changes in the marital *opportunity structure*. Changes in relative rates (the odds ratios of homogamy or intermarriage), controlling for changes in the marginal distributions at the national level, tell us little about changes in the marital opportunity structure at the 'local' level, whether defined geographically or organizationally (i.e., in schools and workplaces), where most future partners meet.

The increased tendency of U.S. women with some post-secondary education to marry down and small increases in intermarriage by female university graduates in the 1990s in both countries are seemingly consistent with Oppenheimer's (1994: 315) observations concerning changing preferences, the expectation that more-educated women are more willing and able "to marry a man who is unlikely to be a great provider but who is highly desirable in other respects." However, it is important to point out that the rising intermarriage in the United States occurred predominantly between women with some college education and men with high-school graduation. Women with some college education were not the ones with the greatest economic resources or potential. Indeed, even by 2000 they still had a much lower labour force participation rate than men with high-school graduation. Among those who participated in the labour force, women with some college education still earned less than 60% of what male high-school graduates did.[15] Similarly, university-educated women had a much lower labour force participation rate and lower average earnings than men with some college education. Therefore, the large increase in intermarriage among women with some college education over the three decades and the small increase in intermarriage among women who finished college education may primarily reflect the possibility that those well-educated women who are not successful in the labour market marry men who are less educated but manage to be in a superior financial position. More empirical studies are needed to confirm this possibility.

15. Based on the 2000 U.S. Census public use sample, we find that among married young women (under age 35) the labour force participation rate (defined here as the percentage with positive employment earnings in the previous year) was about 82% among the university educated, 72% among those with some college education, and 66% among high-school graduates. Among those with positive employment earnings, the average earnings were $34,000 among the university educated, $21,100 among those with some college education, and $17,300 among high-school graduates. Among married young men, the labour force participation rate was 96% among the university educated, 94% among those with some college education, and 91% among high-school graduates. Among young husbands with positive employment earnings, the average earnings were $55,800 among the university educated, $36,700 among those with some college education, and $31,700 among high-school graduates.

The overall downward trend in intermarriage, especially from 1970 to 1990 in the United States and from 1971 to 1991 in Canada, does not support Mare's (1991) life-course hypothesis, which postulates changes in the opportunity structure as the causal mechanism—that the rising time gap between school completion and marriage increases the probability that men and women with different educational backgrounds will meet one another. In particular, the life-course hypothesis suggests that marriage across barriers at the university level is particularly sensitive to the time gap between school leaving and marriage. However, the time gap for the university educated rose continuously over three decades in Canada while intermarriage by the university-educated people decreased significantly from 1970 to 1990 and only increased slightly in the 1990s.[16]

It is clear, however, that the U-turn in marital homogamy postulated by modernization theorists (Smits, Ultee and Lammers, 1998; Smits, Ultee and Lammers, 2000; and Smits, 2003) has yet to have had large impacts on marital patterns in Canada and the United States. Were it so, this would be good news for policy-makers and those concerned with rising inequality in family incomes. The rise in educational homogamy, along with increased selection into marriage based on education, has been a potent force underlying rising inequality in family earnings. Were it the case that these trends in absolute levels of marital homogamy were driven mainly by the revolution in women's educational attainment (changes in the 'marginals') there would be reason for optimism since that trend is undoubtedly now reaching maturity. But that is not the case: most of the gains in marital homogamy are the result of changes in the association between husbands' and wives' education rather than by changes in their levels. The exceptions to the trend provide some evidence that this upward trend may be abating, but scant hope for any large-scale reversal in the proximate future.

16. In the United States, the time-gap between age at marriage and age at school leaving increased from 1970 through the late 1980s, but may have stabilized in the 1990s (Schwartz and Mare, 2005). In Canada, the gap between the two life-events has been rising continuously since the earlier 1970s. Median age at first marriage has increased by about six years, while median years of schooling among young adults aged from 20 to 30 has only increased from 12 to 14 years.

Table 12 Parameters and interpretations of common log-linear models of educational assortative marriages for couples aged under 35, United States, 1970 and 2000

1970

1. Quasi-independence model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	2.2	0.0	0.0	0.0	0.0
(2)	0.0	1.0	0.0	0.0	0.0
(3)	0.0	0.0	0.6	0.0	0.0
(4)	0.0	0.0	0.0	0.7	0.0
(5)	0.0	0.0	0.0	0.0	2.7

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-3.2	...	...	...
(3)	-2.8	-1.6	...	...
(4)	-2.9	-1.7	-1.3	...
(5)	-4.9	-3.7	-3.3	-3.4

2. Crossings model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.8	-1.6	-2.6	-3.5
(2)	-0.8	0.0	-0.8	-1.8	-2.7
(3)	-1.6	-0.8	0.0	-1.0	-1.9
(4)	-2.6	-1.8	-1.0	0.0	-1.0
(5)	-3.5	-2.7	-1.9	-1.0	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.6	...	...	...
(3)	-3.2	-1.6	...	...
(4)	-5.1	-3.5	-2.0	...
(5)	-7.0	-5.4	-3.9	-1.9

3. Distance model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.6	-1.8	-3.4	-4.2
(2)	-0.6	0.0	-0.6	-1.8	-3.4
(3)	-1.8	-0.6	0.0	-0.6	-1.8
(4)	-3.4	-1.8	-0.6	0.0	-0.6
(5)	-4.2	-3.4	-1.8	-0.6	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.2	...	...	...
(3)	-3.6	-1.2	...	...
(4)	-6.7	-3.6	-1.2	...
(5)	-8.5	-6.7	-3.6	-1.2

4. Quasi-symmetry model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.6	-1.6	-2.9	-4.3
(2)	-0.6	0.0	-0.6	-1.9	-3.7
(3)	-1.6	-0.6	0.0	-0.7	-2.0
(4)	-2.9	-1.9	-0.7	0.0	-0.7
(5)	-4.3	-3.7	-2.0	-0.7	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.3	...	...	...
(3)	-3.1	-1.2	...	...
(4)	-5.7	-3.7	-1.4	...
(5)	-8.5	-7.5	-3.9	-1.4

2000

1. Quasi-independence model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	3.7	0.0	0.0	0.0	0.0
(2)	0.0	1.8	0.0	0.0	0.0
(3)	0.0	0.0	1.0	0.0	0.0
(4)	0.0	0.0	0.0	0.3	0.0
(5)	0.0	0.0	0.0	0.0	2.4

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-5.5	...	...	...
(3)	-4.7	-2.8	...	...
(4)	-4.0	-2.1	-1.3	...
(5)	-6.1	-4.2	-3.4	-2.7

2. Crossings model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-1.2	-2.1	-2.9	-4.1
(2)	-1.2	0.0	-0.9	-1.8	-2.9
(3)	-2.1	-0.9	0.0	-0.8	-2.0
(4)	-2.9	-1.8	-0.8	0.0	-1.1
(5)	-4.1	-2.9	-2.0	-1.1	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-2.4	...	...	...
(3)	-4.2	-1.9	...	...
(4)	-5.9	-3.5	-1.7	...
(5)	-8.2	-5.8	-3.9	-2.3

3. Distance model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.8	-2.0	-3.5	-4.2
(2)	-0.8	0.0	-0.8	-2.0	-2.9
(3)	-2.0	-0.8	0.0	-0.8	-2.0
(4)	-3.5	-2.0	-0.8	0.0	-0.8
(5)	-4.5	-3.5	-2.0	-0.8	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.7	...	...	...
(3)	-4.0	-1.7	...	...
(4)	-6.9	-4.0	-1.7	...
(5)	-9.1	-6.9	-4.0	-1.7

4. Quasi-symmetry model

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-1.1	-2.0	-3.2	-4.6
(2)	-1.1	0.0	-0.8	-1.8	-3.8
(3)	-2.0	-0.8	0.0	-0.7	-2.1
(4)	-3.2	-1.8	-0.7	0.0	-1.0
(5)	-4.6	-3.8	-2.1	-1.0	0.0

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-2.3	...	...	...
(3)	-4.0	-1.6	...	...
(4)	-6.3	-3.5	-1.4	...
(5)	-9.2	-7.6	-4.2	-2.0

... not applicable

1. Wife's education level

Notes: Education levels are as follows: (1) Less than Grade 9, Grades 9 to 11; (2) Grade 12; (3) College 1 to 3; (4) College 4 and over. Goodness of fit for 1970: quasi independent model: d.f. =11, L^2 = 17783, BIC=17656; crossings model: d.f. =12, L^2=2398, BIC=2260; distance model: d.f.=12, L^2=705, BIC=567; quasi-symmetry model: d.f.=6, L^2=270, BIC=201, n =100470. Goodness of fit for 2000: quasi-independent model: d.f. =11, L^2 = 10145, BIC=10018; crossings model: d.f. =12, L^2=1005, BIC=867; distance model: d.f.=12, L^2=946, BIC=808; quasi-symmetry model: d.f.=6, L^2=12, BIC=-57, n =100180.

Source: University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Table 13 Parameters and interpretations of common log-linear models of educational assortative marriages for couples aged under 35, Canada, 1971 and 2001

1971

1. Quasi-independence model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	1.8	0.0	0.0	0.0	0.0
(2)	0.0	0.5	0.0	0.0	0.0
(3)	0.0	0.0	0.6	0.0	0.0
(4)	0.0	0.0	0.0	0.8	0.0
(5)	0.0	0.0	0.0	0.0	3.1

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-2.2	...	...	...
(3)	-2.3	-1.0	...	...
(4)	-2.3	-1.2	-1.3	...
(5)	-4.9	-3.6	-3.7	-3.9

2. Crossings model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.8	-1.4	-2.0	-3.2
(2)	-0.8	0.0	-0.6	-1.3	-2.5
(3)	-1.4	-0.6	0.0	-0.7	-1.9
(4)	-2.0	-1.3	-0.7	0.0	-1.2
(5)	-3.2	-2.5	-1.9	-1.2	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.6	...	...	...
(3)	-2.7	-1.2	...	...
(4)	-4.1	-2.5	-1.4	...
(5)	-6.5	-4.9	-3.8	-2.4

3. Distance model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.6	-1.3	-2.2	-4.1
(2)	-0.6	0.0	-0.6	-1.3	-2.2
(3)	-1.3	-0.6	0.0	-0.6	-1.6
(4)	-2.2	-1.3	-0.6	0.0	-1.3
(5)	-4.1	-2.2	-1.3	-0.6	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.1	...	...	...
(3)	-2.7	-1.1	...	...
(4)	-4.5	-2.7	-1.1	...
(5)	-8.2	-4.5	-2.7	-1.1

4. Quasi-symmetry model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.7	-1.5	-1.8	-4.4
(2)	-0.7	0.0	-0.5	-1.0	-3.0
(3)	-1.5	-0.5	0.0	-0.5	-1.9
(4)	-1.8	-1.0	-0.5	0.0	-0.8
(5)	-4.4	-3.0	-1.9	-0.8	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.3	...	...	...
(3)	-3.0	-0.9	...	...
(4)	-3.7	-2.0	-1.1	...
(5)	-8.8	-6.0	-3.9	-1.6

2001

1. Quasi-independence model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	4.6	0.0	0.0	0.0	0.0
(2)	0.0	2.0	0.0	0.0	0.0
(3)	0.0	0.0	1.2	0.0	0.0
(4)	0.0	0.0	0.0	-0.1	0.0
(5)	0.0	0.0	0.0	0.0	2.4

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-6.6	...	...	...
(3)	-5.8	-3.2	...	...
(4)	-4.5	-1.9	-1.2	...
(5)	-7.0	-4.4	-3.6	-2.4

2. Crossings model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-1.7	-2.4	-3.0	-4.2
(2)	-1.7	0.0	-0.7	-1.3	-2.5
(3)	-2.4	-0.7	0.0	-0.6	-1.8
(4)	-3.0	-1.3	-0.6	0.0	-1.2
(5)	-4.2	-2.5	-1.8	-1.2	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-3.4	...	...	...
(3)	-4.9	-1.5	...	...
(4)	-6.1	-2.7	-1.2	...
(5)	-8.4	-5.0	-3.5	-2.3

3. Distance model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-0.9	-1.5	-3.0	-4.9
(2)	-0.9	0.0	-0.9	-1.5	-3.0
(3)	-1.5	-0.9	0.0	-0.9	-1.5
(4)	-3.0	-1.5	-0.9	0.0	-0.9
(5)	-4.9	-3.0	-1.5	-0.9	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-1.8	...	...	...
(3)	-3.0	-1.8	...	...
(4)	-6.0	-3.0	-1.8	...
(5)	-9.8	-6.0	-3.0	-1.8

4. Quasi-symmetry model

Parameters

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)	(5)
(1)	0.0	-1.7	-2.3	-2.9	-5.2
(2)	-1.7	0.0	-1.0	-1.1	-3.1
(3)	-2.3	-1.0	0.0	-0.6	-2.2
(4)	-2.9	-1.1	-0.6	0.0	-1.0
(5)	-5.2	-3.1	-2.2	-1.0	0.0

Log odds ratios of intermarriage between two education levels

Wife's[1]	Husband's education level (1)	(2)	(3)	(4)
(1)	...	...	...	...
(2)	-3.4	...	...	...
(3)	-4.6	-2.0	...	...
(4)	-5.9	-2.2	-1.3	...
(5)	-10.5	-6.3	-4.3	-2.1

...not applicable

1. Wife's education level.

Notes: Education levels are as follows: (1) Less than high school, (2) Some high school, (3) High school graduation, (4) Some post-secondary, (5) University degree and over. Goodness of fit for 1971: quasi-independent model: d.f.=11, L2=12756, BIC=12629; crossings model: d.f.=12, L2=1899, BIC=1761; distance model: d.f.=12, L2=2029; BIC=1901; quasi-symmetry model: d.f.=6; L2=70, BIC=1, n=100590. Goodness of fit for 2001: quasi-independent model: d.f. =11, L2 = 5593, BIC=5466; crossings model: d.f=12, L2=1725, BIC=1587; distance model: d.f.=12, L2=3498, BIC=3360; quasi-symmetry model: d.f.=6, L2=13, BIC=-6, n=100640.

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files.

Table 14 Changes in the parameters in quasi-symmetry and hypergamy models for marriages among young adults, United States and Canada

	United States		Canada, legally married and common law		Canada, legally married	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
Quasi-symmetry						
λ_{s51}, **1970**[1]	-4,22 ***	-4,26 ***	-4,37 ***	-4,37 ***	-4,37 ***	-4,37 ***
Δ1980/1970	-0,04	-0,01	-0,08	-0,09	-0,10	-0,12
Δ1990/1970	-0,57 ***	-0,49 **	-0,56 **	-0,53 **	-0,72 ***	-0,69 ***
Δ2000/1970	-0,53 ***	-0,29 *	-0,55 ***	-0,48 **	-0,89 ***	-0,76 ***
λ_{s52}, **1970**	-3,75 ***	-3,78 ***	-2,99 ***	-2,99 ***	-2,99 ***	-2,99 ***
Δ1980/1970	-0,12	-0,10	-0,01	-0,01	0,00	-0,01
Δ1990/1970	-0,07	-0,01	-0,18 ***	-0,14 **	-0,19 ***	-0,15 **
Δ2000/1970	-0,16 *	0,04	-0,23 ***	-0,17 **	-0,18 ***	-0,07
λ_{s53}, **1970**	-2,02 ***	-2,09 ***	-1,95 ***	-1,97 ***	-1,95 ***	-1,97 ***
Δ1980/1970	0,01	0,05	-0,23 ***	-0,23 ***	-0,24 ***	-0,24 ***
Δ1990/1970	-0,11 ***	-0,01	-0,21 ***	-0,17 ***	-0,22 ***	-0,18 ***
Δ2000/1970	-0,19 ***	0,01	-0,29 ***	-0,23 ***	-0,24 ***	-0,13 **
λ_{s54}, **1970**	-0,79 ***	-0,89 ***	-0,82 ***	-0,84 ***	-0,81 ***	-0,84 ***
Δ1980/1970	-0,06 **	0,00	-0,19 ***	-0,19 ***	-0,19 ***	-0,20 ***
Δ1990/1970	-0,24 ***	-0,10 ***	-0,27 ***	-0,22 ***	-0,27 ***	-0,22 ***
Δ2000/1970	-0,30 ***	-0,09 **	-0,24 ***	-0,18 ***	-0,23 ***	-0,13 ***
λ_{s41}, **1970**	-2,94 ***	-3,04 ***	-1,86 ***	-1,88 ***	-1,85 ***	-1,88 ***
Δ1980/1970	0,04	0,11	-0,01	-0,01	-0,03	-0,04
Δ1990/1970	-0,14	0,00	-0,46 ***	-0,41 ***	-0,53 ***	-0,48 ***
Δ2000/1970	-0,33 ***	-0,08	-0,71 ***	-0,64 ***	-1,11 ***	-0,99 ***
λ_{s42}, **1970**	-1,94 ***	-2,01 ***	-1,03 ***	-1,05 ***	-1,03 ***	-1,05 ***
Δ1980/1970	0,04	0,09 *	0,22 ***	0,22 ***	0,21 ***	0,20 ***
Δ1990/1970	0,13 ***	0,24 ***	0,01	0,06 *	-0,01	0,04
Δ2000/1970	0,08 *	0,29 ***	-0,06 **	0,00	-0,07 ***	0,02
λ_{s43}, **1970**	-0,79 ***	-0,89 ***	-0,55 ***	-0,58 ***	-0,55 ***	-0,58 ***
Δ1980/1970	0,04 **	0,10 ***	0,03 *	0,04	0,03	0,03
Δ1990/1970	0,07 ***	0,19 ***	-0,08 ***	-0,03	-0,07 ***	-0,02
Δ2000/1970	0,02	0,23 ***	-0,12 ***	-0,06 *	-0,10 ***	-0,01
λ_{s31}, **1970**	-1,66 ***	-1,76 ***	-1,54 ***	-1,56 ***	-1,53 ***	-1,56 ***
Δ1980/1970	-0,16 ***	-0,10 *	0,09 **	0,09 *	0,07 *	0,07
Δ1990/1970	-0,45 ***	-0,32 ***	-0,26 ***	-0,21 ***	-0,39 ***	-0,34 ***
Δ2000/1970	-0,42 ***	-0,20 ***	-0,45 ***	-0,39 ***	-0,79 ***	-0,69 ***
λ_{s32}, **1970**	-0,69 ***	-0,78 ***	-0,48 ***	-0,50 ***	-0,48 ***	-0,50 ***
Δ1980/1970	-0,08 ***	-0,03	-0,23 ***	-0,23 ***	-0,24 ***	-0,25 ***
Δ1990/1970	-0,11 ***	0,00	-0,38 ***	-0,34 ***	-0,42 ***	-0,37 ***
Δ2000/1970	-0,18 ***	0,02	-0,44 ***	-0,38 ***	-0,56 ***	-0,47 ***
λ_{s21}, **1970**	-0,72 ***	-0,81 ***	-0,67 ***	-0,69 ***	-0,67 ***	-0,69 ***
Δ1980/1970	-0,13 ***	-0,08 *	-0,20 ***	-0,20 ***	-0,22 ***	-0,23 ***
Δ1990/1970	-0,49 ***	-0,38 ***	-0,43 ***	-0,39 ***	-0,55 ***	-0,50 ***
Δ2000/1970	-0,49 ***	-0,30 ***	-0,77 ***	-0,72 ***	-1,05 ***	-0,97 ***
Hypergamy, 1970	0,18 ***	0,36 ***	0,03 *	0,07 **	0,02	0,07 **
Δ1980/1970	...	-0,11 **	...	0,00	...	0,01
Δ1990/1970	...	-0,24 ***	...	-0,09 **	...	-0,10 **
Δ2000/1970	...	-0,41 ***	...	-0,12 **	...	-0,19 ***

...not applicable

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

1. For Canada, the years are the following: λs51, 1971; D1981/1971, D1991/1971, D2001/1971.

Notes: Results for Models 1 and 2 are not presented here; see Table 9 for the specifications. All models in this table contain the main effets of wives' education, husbands' education, and period; and two-way interactions between period and education.

Sources: Statistics Canada, 1971 Census of Canada, 33% sample microdata file and 1981-to-2001 decennial Censuses of Canada, 20% sample microdata files; University of Minnesota, Minnesota Population Center, 1970to-2000 U.S. Census public use microdata files.

Appendix A Trends in educational homogamy among newly formed first marriages

The data on recent first marriage for the United States were derived from the 1970 U.S. Census public use 1% sample microdata file and the 1980 U.S. Census public use 5% sample microdata file, as well as the 1990 and 1992 June Current Population Survey. All these files were downloaded from Integrated Public Use Microdata Series (Ruggles et al., 2003). The most recent data were from the Survey of Income and Program Participation, 2001 Panel, Wave 2 (United States Department of Commerce, 2004). For Canada, the data were derived from the 1971 Census 33% Public Use Sample Tape of Families (Statistics Canada, 1975), the 1984 Canadian Fertility Survey (Balakrishnan, Krotki and Lapierre-Adamcyk, 1988), and the 1990 and 2001 General Social Survey (Statistics Canada, 1991; 2002).

Recent first marriages were defined as persons who are married for the first time within the previous two years in United States and within the previous three years in Canada. We use a one year longer time span for Canada to increase sample size. We only include those who are aged under 35 at the time of survey to make it compatible with our analysis on prevailing marriages where including those who are older ages would create too much overlap over a 10-year period. We only consider marriages among the white population since racial intermarriages may involve a unique pattern of educational matching (Kalmijn, 1991), and we cannot obtain a large enough sample size from recent surveys to study non-white population groups separately.

As shown in Tables A.1 and A.2, the sample size for different years ranges from 450 to 76,850 married couples in the United States and from 520 to 4,350 in Canada. Following the common practice in the literature (e.g., Raymo and Xie, 2000), we rescale the sample size to about 2,000 for each year. We also use both larger and smaller rescaled sample sizes to test the sensitivity of our results. The parameter estimates based on different rescaled sample sizes are very similar in value, but are more likely to be significant with larger sample size.

Tables A.1 and A.2, show the percentage distribution of newlyweds by wives' and husbands' level of education in the United States from 1970 to 2001, and Canada from 1971 to 2001. The row and column totals reveal that the average educational attainment increased dramatically for both sexes over the past four decades, particularly for women (the column total). For instance, in 2001, 45.9% of wives and 37.3% of husbands finished university education in the United States, compared with 14.2% and 20.2% in 1970. Now newly married wives had higher average education levels than their husbands, while the opposite was true 40 years ago. Canada also experienced a similar change.

These tables also show some overall changes in educational homogamy among recent first marriages. A crude measure of educational homogamy is the percentage of marriages involving men and women of the same education level (the sum of diagonal cells in the 5 by 5 tables). Judged from this measure, the United States and Canada seem to have experienced different trends in educational homogamy. In the 1970s, 51% of recent first marriages are educationally homogamous in the United States. The percentage of first marriages involving spouses in the same schooling categories in the United States rose steadily to 53% in 1980, 55% in the early 1990s, and since then fell to 52% in 2001. In Canada, the level of educational homogamy among newlyweds changed little from 1971 to 1990, but rose abruptly from 44% in 1990 to 57% in 2001. Since the sample size for the United States in 2001 and for Canada since 1984 was small,

although still in the order of some published studies (e.g., Kalmijn, 1991a; 1991b; Halpin and Chan, 2003), we should exercise caution in interpreting these trends.

Results from the log-multiplicative layer effect models show that the level of educational homogamy among newlywed first marriages changed little in both the United States and Canada from 1970 to 1990. Since then educational homogamy decreased in the United States, but rose substantially in Canada. The normalized Φ parameter showing the relative strength of educational homogamy (Xie, 1992) was 0.52 in 1970, 0.54 in 1980, 0.52 in 1990, and 0.41 in 2001. The corresponding numbers in Canada are 0.49, 0.44, 0.45, and 0.60. Again, the examination of change during the 1990s was based on a small sample in both countries.

Since our sample size for the 1990s is too small for first marriages, we do not conduct further analyses on heterogeneous change by education level.

Table A.1 Assortative marriage on educational attainment for newlyweds, United States, 1970, 1980, 1990 and 1992, and 2001

Wife's years of schooling	Husband's years of schooling					Total	Sum of diagonals
	< 9	9 to 11	12	13 to 15	>= 16		
	percent						
1970							
< 9	1.7	1.2	0.9	0.1	0.1	7.4	
9 to 11	1.7	5.0	5.9	1.1	0.2	10.4	
12	1.8	6.5	26.1	9.8	3.9	48.0	
13 to 15	0.2	0.8	4.7	8.0	6.2	19.9	
>= 16	0.1	0.2	1.3	2.8	9.9	14.2	
Total	5.4	13.7	38.9	21.8	20.2	100.0	50.8
Sample size						15,697	
1980							
< 9	1.2	0.9	0.7	0.2	0.1	6.1	
9 to 11	1.0	4.6	5.6	1.0	0.2	9.2	
12	1.0	5.5	26.5	8.5	3.4	44.8	
13 to 15	0.2	0.8	6.6	9.0	6.0	22.7	
>= 16	0.0	0.1	1.7	3.5	11.9	17.3	
Total	3.4	12.0	41.1	22.1	21.5	100.0	53.1
Sample size						76,848	
1990-92							
< 9	1.5	0.5	0.6	0.2	0.1	2.8	
9 to 11	0.6	3.8	4.5	0.6	0.1	9.6	
12	1.2	3.2	23.2	4.8	3.1	35.6	
13 to 15	0.6	1.2	8.9	10.3	5.8	26.8	
>= 16	0.1	0.3	4.0	4.9	16.1	25.3	
Total	4.0	8.9	41.2	20.7	25.2	100.0	54.9
Sample size						1,596	
2001							
< 9	2.1	0.5	0.4	0.0	0.0	3.0	
9 to 11	0.2	3.5	4.4	2.0	0.4	10.5	
12	0.4	1.9	11.9	4.4	4.3	22.7	
13 to 15	0.0	1.3	6.3	6.1	4.1	17.8	
>= 16	0.0	1.0	8.9	7.4	28.6	45.9	
Total	2.7	8.1	31.9	19.9	37.3	100.0	52.2
Sample size						447	

Sources: University of Minnesota, Minnesota Population Center, 1970 and 1980 U.S. Census public use microdatafiles, and 1990 and 1992 June Current Population Survey; United States Department of Commerce, Survey of Income and Program Participation, 2001 Panel, Wave 2.

Table A.2 Assortative marriage on educational attainment for newlyweds, Canada, 1971, 1984, 1990 and 2001

Wife's years of schooling	Husband's years of schooling (1)	(2)	(3)	(4)	(5)	Total	Sum of diagonals
			percent				
1971							
(1) < Grade 9	6.8	5.1	0.8	0.5	0.2	13.5	
(2) Some high school	7.0	18.6	7.6	3.4	1.8	38.5	
(3) High-school graduation	2.5	9.6	9.7	4.5	2.9	29.0	
(4) Some post-secondary	0.6	2.1	2.6	4.3	3.5	13.0	
(5) University degree +	0.1	0.3	0.4	1.0	4.2	6.0	
Total	17.0	35.6	21.2	13.6	12.6	100.0	43.7
Sample size						4,346	
1984							
(1) < Grade 9	0.6	0.8	1.0	0.0	0.2	2.5	
(2) Some high school	1.7	3.1	10.3	2.3	0.7	18.2	
(3) High-school graduation	0.8	0.9	23.6	6.9	4.4	36.6	
(4) Some post-secondary	0.2	0.9	9.7	9.5	6.5	26.8	
(5) University degree +	0.2	0.4	3.7	3.1	8.6	15.8	
Total	3.5	6.2	48.3	21.8	20.3	100.0	45.4
Sample size						514	
1990							
(1) < Grade 9	0.7	0.1	0.4	0.8	0.0	1.9	
(2) Some high school	0.5	3.8	4.1	2.3	0.5	11.1	
(3) High-school graduation	0.9	4.9	8.4	10.4	1.5	26.0	
(4) Some post-secondary	0.3	6.5	8.1	19.6	6.1	40.6	
(5) University degree +	0.9	0.4	1.4	6.2	11.6	20.4	
Total	3.1	15.7	22.3	39.3	19.7	100.0	44.0
Sample size						450	
2001							
(1) < Grade 9	0.1	0.2	0.0	0.3	0.0	0.6	
(2) Some high school	0.1	1.7	0.6	0.6	0.0	3.0	
(3) High-school graduation	0.3	1.4	7.2	8.3	0.5	17.6	
(4) Some post-secondary	0.6	2.8	11.1	24.9	6.1	45.4	
(5) University degree +	0.1	0.3	3.4	6.4	23.3	33.4	
Total	1.2	6.3	22.2	40.4	29.9	100.0	57.2
Sample size						522	

Sources: Statistics Canada, 1971 Census of Canada Public Use Sample Tape of Families and 1990 and 2001 General Social Survey; University of Western Ontario, Population Studies Centre, 1984 Canadian Fertility Survey.

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